EXPLORING EARTH'S MYSTERIES
...PROTECTING ITS FUTURE

Waste Management Facility

Facility Environmental Monitoring Report

Calendar Year 2004

BROOKHAVEN
NATIONAL LABORATORY

August 5, 2005

Prepared by
D. Paquette, M. Allocco and B. Hooda
Environmental and Waste Management Services Division

GW64ER.05

Brookhaven National Laboratory Waste Management Facility

Facility Environmental Monitoring Report
Calendar Year 2004

Summary of Results

Environmental monitoring conducted at the Waste Management Facility during 2004 continues to indicate that waste management operations are not impacting environmental quality. No contaminants related to Waste Management Facility operations were identified in groundwater samples, or in water samples collected from SPDES Outfall 003. Environmental TLD ambient measurements indicate that the dose in the vicinity of the WMF is equivalent to background values.

Background

The Waste Management Facility (WMF) is designed to safely handle, repackage, and temporarily store BNL-derived wastes prior to shipment to an off-site disposal or treatment facility. The WMF has been designed with engineering controls that meet all applicable federal, state, and local environmental protection requirements. Moreover, institutional controls such as spill prevention plans, operations management plans, maintenance, and personnel training ensure that the facility operates in a manner that protects the environment and human health.

The WMF is adjacent to BNL Potable Supply Wells 11 and 12, which are located south of East Fifth Avenue and just north of the WMF site (Figure 1). Because of the close proximity of the WMF to Potable Wells 11 and 12, it is imperative that the engineered and institutional controls are effective in ensuring that waste handling operations do not degrade the quality of the soils and groundwater in this area. The monitoring program for the WMF is designed to supplement the engineered and institutional controls by providing additional means of detecting potential contaminant releases.

Environmental Monitoring Program

As required by DOE Order 450.1 and the facility's RCRA Part B Permit, BNL has established an environmental monitoring program for this facility to evaluate potential impacts to environmental quality resulting from its operation. The environmental monitoring program for the WMF is described in the *BNL Environmental Monitoring Plan* (BNL, 2004). Monitoring results for CY 2004 are summarized below.

Monitoring Results

Groundwater

The *2004 Groundwater Monitoring Report for the Waste Management Facility* is provided as Attachment 1. This report was submitted to the NYSDEC as part of the *2004 Hazardous Waste Report* (BNL, 2005).

Groundwater monitoring results for 2004 continue to show that Waste Management Facility operations are not affecting groundwater quality. Since the beginning of Waste Management Facility operations in 1997, there have been no outdoor or indoor spills at the facility that could have impacted soil or groundwater quality. During 2004, the Waste Management Facility groundwater monitoring wells were sampled two times, with samples collected in February and August. Except for low-levels of sodium and aluminum detected in several wells, all chemical and radionuclide concentrations were below New York State Drinking Water or Ambient Water Quality Standards. The sodium is likely to have originated from road salting operations, and the aluminum is probably related to naturally occurring minerals within the Upper Glacial aquifer. Low levels of the radionuclide tritium, that were initially detected in several Waste Management Facility wells during 2003, decreased to non-detectable levels by the end of 2004. Although a definitive source for the tritium has not been identified, a thorough review of Waste Management Facility operations indicated that the tritium was not released from this facility. Rather the periodic detection of tritium in one of the upgradient wells suggests that the tritium was released from another nearby facility or system.

Stormwater Discharges

State Pollutant Discharge Elimination System (SPDES): Storm water runoff from the WMF roofs and pavement is conveyed to SPDES-permitted Outfall 003 (HO). In late 2001, the Laboratory petitioned NYSDEC to remove the monitoring requirement for Outfall 003 from the Laboratory's SPDES discharge permit. These changes were approved by NYSDEC and a revised SPDES permit was received in February 2002. This discharge was not monitored under the SPDES program in 2004. Although NYSDEC is not requiring monitoring at this outfall, BNL still monitors the flow and pH on a weekly basis, and the discharges are also monitored quarterly under the Environmental Surveillance program described below.

Environmental Surveillance: Under the BNL Environmental Surveillance program, the discharge is sampled quarterly for volatile organics, metals, water chemistry parameters (chlorides, nitrates, and sulfates), radionuclides, and field-measured parameters (pH, conductivity).

During 2004, no gamma-emitting radionuclides related to Laboratory operations were detected in the discharges to Outfall 003. All gross alpha concentrations were below the

MDL. A gross beta concentration of 3.6 ± 1.1 pCi/L was detected in the discharge from Outfall 003 on May 17, 2005 and was probably due to entrainment of sediment in the sample. Tritium was detected in the February 6, 2005, sample at a concentration of 290 ± 180 pCi/L. This was slightly above the MDL of 230 pCi/L.

The Outfall 003 discharge chloride concentration was 766 mg/L on February 6, 2005, which exceeded the NYS groundwater effluent standard of 250 mg/L. For this sample, the corresponding conductivity was 2,160 µS/cm. This evidence points to road salt as the most likely cause of the elevated results. Analyses for metals did not find any parameters above the NYS effluent standards, with most being at non-detectable levels. Low levels of trihalomethanes were sporadically detected in the discharges to Outfall 003. However, these compounds are common potable water disinfection by-products, and are not attributable to WMF operations. Acetone and methylene chloride are sporadically detected in many basin discharges, however, these compounds are usually associated with cross-contamination in the analytical lab.

Environmental TLDs

Ambient environmental background radiation monitoring is conducted through a network of on-site and off-site environmental TLDs placed in the upwind and downwind sectors. These TLDs measure radiation from cosmic and terrestrial sources of radiation, as well as contribution from Laboratory operations. One of the TLDs (066-TLD1) is located between the WMF and Recharge Basin HO, and is used to measure any contribution from the Waste Management Facility (Figure 1). The environmental TLDs are collected and read on a quarterly frequency. The ambient dose rates for the first, second, third, and fourth quarters were 14.4, 13.2, 12.9, and 15.5 mrem, respectively. The annual external dose at this location was estimated to be 56 ± 9 mrem, and was similar to normal background radiation found in the area. Therefore, it can be concluded that there was no external dose contribution from waste handling activities.

Evaporator Facility

Some of the liquid wastes generated at BNL contained residual radioactivity, and they were sent for treatment to the Waste Concentration Facility (Bldg. 811). Many of the radionuclides present in the liquid waste were removed by using a reverse osmosis process. However, because the chemical properties of tritium are similar to hydrogen, it cannot be removed from the aqueous phase using this process. The tritiated water was transferred to the Evaporator Facility (Bldg. 802B), where it was converted to steam and released to the atmosphere as an emission. Due to difficulties in system maintenance and prohibitive operating costs, the evaporator facility has not been in use since 2001. Therefore, there have been no air emissions from this facility since that time.

Future Monitoring Actions

The 2004 monitoring program will consist of the following:

- Continue collecting semi-annual groundwater samples from the eight WMF wells in accordance with the RCRA Part B Permit.
- Continue the TLD monitoring program on its current schedule.
- Surveillance monitoring will continue the collection of samples from the HO outfall quarterly for radiological and non-radiological parameters, and pH and flow readings will continue to be collected weekly.

References

BNL. 2004. *Brookhaven National Laboratory Environmental Monitoring Plan CY2004.* BNL-52676 (January 2004).

BNL. 2005. *Brookhaven National Laboratory 2004 Groundwater Monitoring Report for the Waste Management Facility*: Attachment A of the *2004 Hazardous Waste Report.* Upton, NY. February 2005.

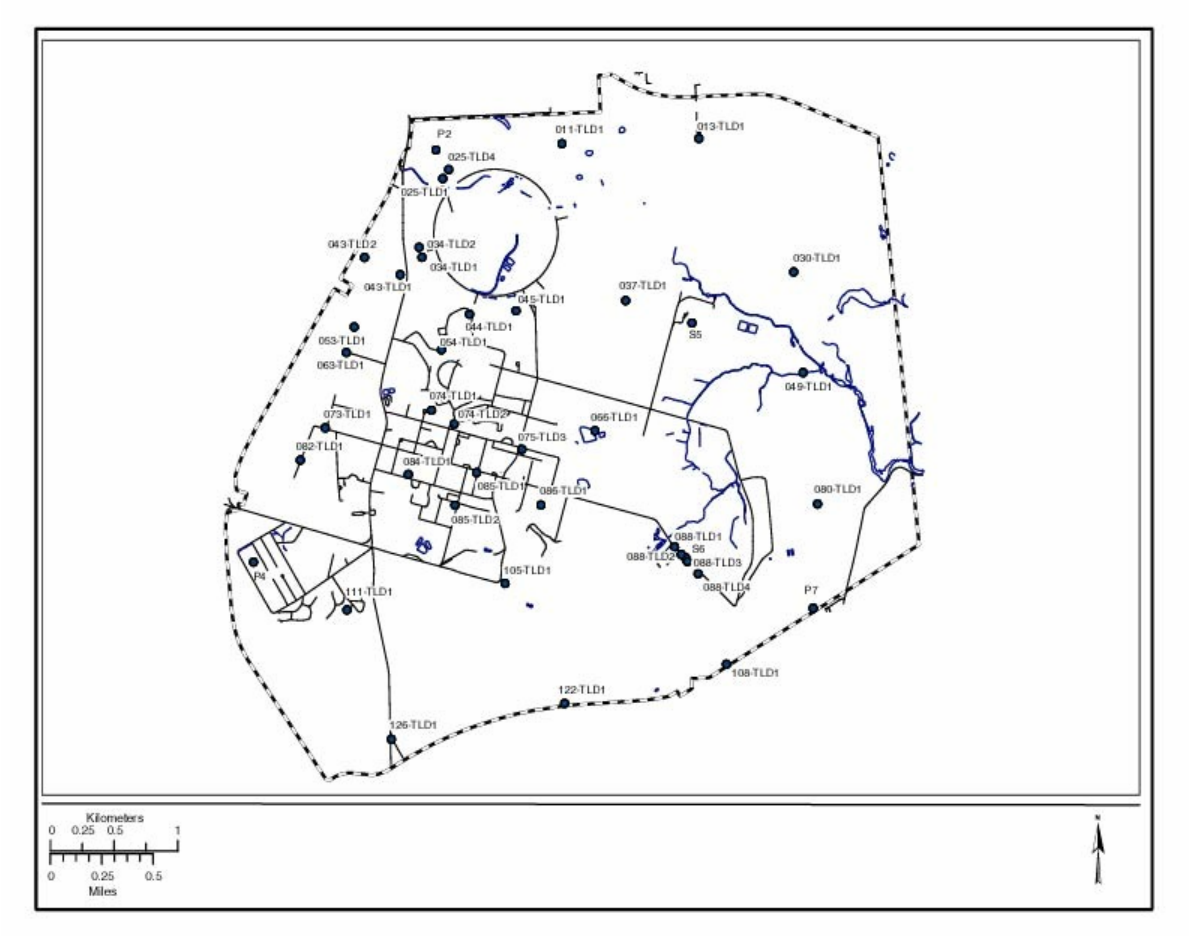

Figure 1: Locations of Environmental TLDs.

Attachment 1

2004 Waste Management Facility Groundwater Monitoring Report